Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
29 JUN 2007	**Technical, Success Story**	**17-07-2006 to 29-06-2007**

4. TITLE AND SUBTITLE
TDI Automated Inspection Process

5a. CONTRACT NUMBER
5b. GRANT NUMBER
5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)

5d. PROJECT NUMBER
06-0098-07
5e. TASK NUMBER
5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
National Center for Defense Manufacturing & Machining,1600 Technology Way,Latrobe,PA,15650

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

10. SPONSOR/MONITOR'S ACRONYM(S)
11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT
Technical Directions, Inc. (TDI), located in Ortonville, MI has been selected by Lockheed Martin Missiles and Fire Control located in Dallas, TX to supply small turbine engines in support of the Low-Cost Autonomous Attack System (LOCAAS) and the Surveilling Miniature Attack Cruise Missile (SMACM) programs. The components for the TDI-J45 engine are being provided by outside vendors selected by TDI. Upon receipt of the components, TDI must inspect each component to verify that it meets all dimensional specifications before assembly. The current inspection process for these components is very time consuming. Each component requires multiple setups in order to be completely inspected for dimensional accuracy. The current method of inspection utilizes v-blocks, angle plates, and modeling clay to ensure the components remain stationary as they are manually inspected using a Sheffield Cordax Discovery II Coordinate Measure Machine (CMM). TDI requested that the National Center for Defense Manufacturing and Machining develop an automated inspection process to decrease the amount of time required to inspect the incoming components.

15. SUBJECT TERMS
National Center for Defense Manufacturing and Machining; Success Stories; NCDMM; Technical Directions, Inc.; Lockheed Martin Missiles and Fire Control; TDI-J45 engine

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**1**	**1**	

TDI Automated Inspection Process

NCDMM Project No. 06-0098-07

Technical Report

PROBLEM / OBJECTIVE

Technical Directions, Inc. (TDI), located in Ortonville, MI has been selected by Lockheed Martin Missiles and Fire Control located in Dallas, TX to supply small turbine engines in support of the Low-Cost Autonomous Attack System (LOCAAS) and the Surveilling Miniature Attack Cruise Missile (SMACM) programs. The components for the TDI-J45 engine (samples shown in Figure #1) are being provided by outside vendors selected by TDI. Upon receipt of the components, TDI must inspect each component to verify that it meets all dimensional specifications before assembly.

The current inspection process for these components is very time consuming. Each component requires multiple setups in order to be completely inspected for dimensional accuracy. The current method of inspection utilizes v-blocks, angle plates, and modeling clay to ensure the components remain stationary as they are manually inspected using a Sheffield Cordax Discovery II Coordinate Measure Machine (CMM). TDI requested that the National Center for Defense Manufacturing and Machining develop an automated inspection process to decrease the amount of time required to inspect the incoming components.

Figure #1
TDI-J45 Engine Components

ACCOMPLISHMENTS / PAYOFF

Process Improvement

The NCDMM assessed the current inspection process for the TDI-J45 components in order to develop a solution that would meet the needs of TDI. The CMM that TDI currently uses was evaluated and it was determined that a Quick-Change Fixture was needed in order to improve the inspection process.

TDI supplied the NCDMM with sample components, along with 2-dimensional drawings and 3-dimensional solid models of the TDI-J45 components.

Implementation and Technology Transfer

The NCDMM designed and built a fixture base that will mount directly to the table of TDI's CMM. This base, along with the twelve component specific end effectors, will allow TDI to orient the TDI-J45 components in a repeatable fashion (Figure #2). This will in turn allow for quicker inspection of the components by utilizing the full 5-axis capabilities of the CMM.

Figure #2
CMM Inspection Station

Expected Benefits

The quick-change inspection fixture will enable TDI to inspect TDI-J45 components in a more automated fashion. It is estimated that the fixture will reduce setup time by approximately five minutes for each inspection. TDI estimates an annual production volume of approximately 3,000 units. During production, TDI plans on a 100% inspection for the first two years followed by a 10% inspection smpling during the following 13 years. This results in a projected cost savings of $316,800 over the fifteen-year life cycle of the program.

TIME LINE / MILESTONE

Start Date……July 2006
End Date……June 2007

PROJECT FUNDING

NCDMM Funding……..……$78K

PARTICIPANTS

CNC Software, Inc.
Fryer Machine Systems Inc.
Haas Automation, Inc.
Kennametal Inc.
NCDMM

For additional information about the NCDMM visit our website at www.ncdmm.org